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Adjusting Boundaries of Russian Firms

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During the last decade we witnessed huge wave of reorganizations in Russian industrial sector: split-ups, spin-offs, mergers and acquisitions. Firms adjusted their boundaries according to the new economic conditions. Little is known however about this process and its determinants. The first goal of this paper is to derive general patterns of boundary change in Russian industrial sector. Second, the author seeks to identify the factors influencing firm's decision to integrate or split up based on modern theory of a firm. In doing this, one needs to understand whether institutional structure of production, inherited from planned economy and characterized by high degree of monopolization and specificity, influenced the process of reorganizations of Russian industrial firms. In particular, author tests the factors of vertical integration suggested by transaction cost theory. Finally, the attempt is made to estimate the effect of structural change on firm performance, in particular, on productivity. In order to answer these questions the author conducts empirical study using the data from the survey of Russian industrial enterprises carried out in 1999-2000.

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1. INTRODUCTION

Since Coase economists asked the question: what determines boundaries of a firm? What is the driving force behind numerous mergers, acquisitions, split-ups, spin-offs, i.e. various structural changes observed in a real economy? Different theories were developed to explain these processes: monopoly power, technological explanation, market size and industry life cycle, uncertainty and risk and, of course, transaction cost theory.

In conditions of planned economy in the former Soviet Union size and boundaries of the firm were determined by very different considerations. Not the "invisible hand" of market but central planning institutions decided where to put a plant, what and how much it should produce and where the product should go. Designed in such a way, Soviet industrial structure wasn't fit to the conditions of market economy.

During the last decade Russian industrial sector has undergone most dramatic changes. In the course of "perestroika" and subsequent reforms industrial output had fallen by 40-60% in different sectors. At the same time we witnessed huge wave of reorganizations: split-ups, spin-offs, mergers and acquisitions. Firms adjusted their boundaries according to new economic conditions. First of all, the collapse of planned economy and Soviet Union triggered massive breakup of large Soviet enterprises. It is a well-known fact that many Soviet enterprises were oversized. Obviously, such inefficient organizations could not survive in new economic conditions when state distribution of resources has gradually ceased. This process coupled with mass privatization of 1992-1994 gave rise to a wave of split-ups and spin-offs.

At the same time, the opposite tendency to integration has occurred. In absence of efficiently functioning resource and product markets and in conditions of general economic instability enterprises had to integrate with their suppliers and buyers in order to reconstruct production chains. The same can be said about reconstruction of production connections broken up by the collapse of Soviet Union. Horizontal integration in order to increase market power also takes place, especially among firms, which obtained access to export markets. A lot was already said and written about vertically integrated firms in oil industry and other natural resource sectors, similar trend recently emerged in food industry and agriculture [17], [18]. Other sectors are no exceptions.

Consequently, the perception is that Russian firms reshaped their boundaries dramatically. It is important to understand fundamental features and consequences of this process. **The first goal of this paper is to derive general patterns of boundary change in Russian industrial sector. Second, I seek to identify the factors influencing firm's decision to integrate or split up based on modern theory of a firm. In particular, I test the factors of vertical integration suggested by transaction cost theory. Finally, the attempt is made to estimate the effect of structural change on firm performance, in particular, on productivity.** This is an empirical paper. I use data from the recent survey of Russian manufacturing enterprises. This is very rich dataset, which

gives vast opportunities for high quality research. Up to the moment there was no extensive empirical study of the reorganizations of Russian firms covering all industrial sectors. Current research is intended to fill this gap.

2. SURVEY OF LITERATURE

When analyzing Russian industrial enterprises, the point to start is Soviet industrial structure. The attempts to study it were made by Western economists as early as in 50-s, using very scarce information available at that time (see **Berliner [1]**). Lately, a lot of studies were devoted to the characteristics of Soviet industrial structure in conditions of what Kornai calls "shortage economy". According to **Kornai [13]**, Soviet industrial production was highly monopolized and concentrated due to specific features of planned economy. Large enterprises were in a stronger position to bargain over distribution of subsidies and resources. From the point of view of central planner it was easier to manage small number of large production units. Besides, enterprises themselves had incentive to vertically integrate because of the disruptions in the delivery of inputs. Consequently, they suffered from diseconomies of scale and inefficient parts of production were often cross-subsidized inside large firms.

At the same time **Brown et al. [3]** argue that it was not high degree of monopolization but rather high degree of segmentation, barriers to competition and absence of small firms that were characteristic of industrial structure. **Blanchard and Kremer [4]** discuss another feature of planned economy, namely, high degree of specificity in relations among firms. Indeed, many firms were dependent on a single supplier or customer. This interdependency of firms coupled with complexity of production processes opens room for adverse effects of specificity vastly studied in economic literature (we'll come back to this later).

With the beginning of transition complex system of economic relations started to disintegrate. Established production chains and bargaining mechanisms broke down. High degree of specificity inherited from Soviet period only worsened the negative effects of what Blanchard and Kremer call "disorganization" of transition, first of all, significant fall of output in many sectors of production. Process of disorganization was accompanied by massive breakups of former monopolies. In a spirit of Schumpeter's idea of "creative destruction" (**Schumpeter [15]**) we can inquire whether disintegration of old industrial structure opened room for new, more effective organizational forms.

Similar tendencies occurred in other transition economies. **Lizal et al.** in their study of breakups of Czechoslovakian state owned firms **[14]** and Macedonian firms **[8]** stress the role of interaction between different goals and interests of the parties to the process, namely, government, management and workers. In the first study Lizal et al. analyze the efficiency effects of firms' breakups in Czechoslovakia. They look at different measures of firm performance and estimate effect of split-up separately on master enterprise and on subsidiary. Basic result is that "the effect is positive for small values of spin-offs and declines with the size of the spin-off and the estimated

effects are similar for the spun off subsidiaries and the remaining master enterprises." In case of Macedonia authors find that breakups were mostly explained by managerial self-interests as opposed to efficiency considerations. This argument is also relevant for Russia because managers of Russian firms inherited huge power from socialist period; hence, their interests as well as interests of state are pivotal to the decision to reorganize.

It is important to understand how Russian firms solve the problem of specificity inherited from Soviet period. Obviously, such mechanisms as competition, reputation, different kinds of contracts, do not work properly in conditions of transition economy. Another solution is vertical integration. This mechanism was vastly studied by transaction costs theory, which originated from Coase's seminal paper (**Coase [5]**). **Oliver Williamson [16]** in his book provided three main conditions for vertical integration. First, basic assumption of transaction costs theory is that contracts are incomplete meaning that it is impossible or prohibitively costly to write down all contingencies of future transactions in all possible states of the world. Thus, virtually any contract is incomplete due to uncertainty and costs of acquiring information. Second condition is opportunistic behavior of parties to the contract that may arise when the third condition is present – namely, asset specificity. Asset specificity, as defined by Williamson, is a characteristic of asset that is used in production of some specific product and its re-deployment for other production purposes is very costly or if sold to another producer it loses most part of its value. Such asset is basically locked in relation with specific producer or specific type of production process. It is clear, that asset specificity is a measure of degree: asset may be more or less specific depending on the relative costs of its re-deployment.

In absence of asset specificity arms-length contracting across the market between producers would be efficient enough. Competition among suppliers and buyers of non-specific asset insures that costs of incomplete contracting (re-negotiation and disputes on unforeseen contingencies) are minimized. As soon as asset specificity arises, parties are effectively tied into bilateral relation and thus exposed to hazards of incomplete contracting. Solution to the problem is to integrate stages of production tied by asset specificity within one firm. General prediction of transaction cost theory is that in case of high degree of asset specificity vertical integration will be preferred to market contractual relation. This is very important efficiency explanation of vertical integration, which nevertheless has its critics, as we will see later.

Williamson [16] also discussed limits to integration, such as increased bureaucracy and costs associated with it and weakened individual incentives. Another advantage of market organization versus integration is that "markets are often able to aggregate diverse demand, thereby to realize economies of scale and scope".

Property rights theory developed by Hart, Grossman and others extends transaction costs theory argument. This approach employs cost and benefit analysis and bargaining theory to "explain what changes when two firms merge". **Grossman and Hart [10]** prove theoretically that distribution of surplus anticipated from different ownership arrangements influences firms' investment incentives and hence costs and benefits of integration. Firm, which obtains ownership rights (defined as

residual rights over assets) will have incentive to overinvest while the other party that looses control will underinvest. The basic conclusion from the analysis is that property right over the asset should belong to the party who has more productive investment decision. The second conclusion is that «highly complementary assets should be under common ownership" which is consistent with Williamsonian hypothesis of asset specificity.

One of the economists who analyzed Williamson's theory of vertical integration from the critical point of view was **Demsetz [7]**. According to him, transaction cost theory over-estimated the importance of opportunistic behavior and "became too narrowly focused on hold-up problem and the role of asset specificity". Demsetz estimates empirically impact of asset specificity on vertical integration. Results of his estimation do not confirm Williamsonian hypothesis. Moreover, results show in some cases negative (though weak) relation between asset specificity and vertical integration. General conclusion of Demsetz is that relationship between vertical integration and asset specificity is ambiguous.

Quite convincing objection to Williamson's theory is provided by practice, namely, by occurring trend towards disintegration, outsourcing, contracting out **[12].** Many economists argue that the problem of contractual incompleteness, which is fundamental for Williamson's explanation of vertical integration, can be mitigated by using different types of contracts. **Hart [11]** explains trend towards disintegration by increased technological flexibility. Consequently, it is important to understand whether patterns of changes of industrial structure in Russia are similar to that in other transition economies as well as to global trends in developed market economies.

Thus, the process of changing boundaries of the firms was vastly studied in theoretical economics, though much less so in implication to transition economies. We can apply rich theoretical material surveyed to the analysis of reorganizations of Russian firms.

3. FACTORS OF STRUCTURAL CHANGE: HYPOTHESES

3.1. Organizational factors

As we have seen from literature survey many economists consider transaction costs as the main driving force of integration. In context of Russian transition economy arguments of transaction costs theory are especially relevant. In conditions of weak contract enforcement, non-transparent legal system and general economic instability hold-up problem is more likely to arise. Examples are abundant throughout. That is why Russian firms should have strong incentive to integrate according to transaction cost theory.

Measuring transaction costs is however tricky. Further I suggest several determinants, which should capture the scope of transaction costs for each firm.

Specificity/complexity. As we already discussed, this factor is very important since assets of former Soviet enterprises were often very specific. In conditions of planned economy they were

produced and supplied by specialized plant (often only one) and it was hard to find substitute. Thus, many enterprises were tied to their suppliers. This interdependency is likely to remain for many enterprises till now as they lack investments to buy new equipment and have to sustain their old highly specific assets.

The problem is that it is very difficult to actually measure degree of asset specificity. Demsetz in his earlier mentioned article used amount of investments in durable goods as a proxy. Another possibility is to look at innovation activity of a firm. Firm that had some innovation is likely to produce a specific good which is not produced elsewhere. More general approach is to use industry-level measures. **Blanchard and Kremer [2]** in their study constructed industry-level indices of complexity of production process, which should also capture asset specificity to an extent.

Lock-in effect. By lock-in effect I mean degree of dependency of a firm on certain supplier or customer. The higher is this dependency the higher is the possibility of opportunistic behavior on the behalf of this partner the higher is incentive to integrate. Again, measuring lock-in effect is complicated. The degree of vertical dependency between supplier and customer may be captured by concentration of input and product markets.

I also use indirect measures of lock-in effect. This variable indicates whether firm was able to switch to new suppliers during 1990-1998. Presumably, firms locked in the relationship with old suppliers couldn't easily switch to new ones. Until recently non-monetary payments were significant phenomenon in Russian industry. Barter necessarily leads to high degree of specificity in relations between firms involved. Hence, share of barter payments may also proxy for lock-in effect.

3.2. Market structure factors

In the beginning of 90-ies markets were liberalized and opened for competition. However, initial market structure was not formed by competitive forces - it was inherited from planned economy. This interaction between exogenously given structure and economic liberalization inevitably should have influenced the behavior of firms. To account for the pre-reform market structure I use measures of concentration/competition. Additional measures of competition are export potential and import penetration.

3.3. Governance factors

Russian firms very actively split up or spun off during privatization and afterwards. It is well documented fact that Russian managers were very powerful players at that stage. Their interests influenced to a large extent the way privatization was carried out. Consequently, it can be argued that managers were pivotal to the decision to split up or spin off, especially in the earlier years of reforms. I proxy interests of managers by the size of managerial ownership stake. Corporate governance literature shows that share ownership provides incentives for manager to maximize value of a firm though the effect is non-linear (Morck, Shleifer and Vishny, 1988).

3.4. Size and productivity of a firm

Finally, I control for pre-reorganization size and labor productivity of a firm. Productivity (measured as a deviation from industry level) should proxy for the profit potential of a firm. Ideally, we would like to estimate separately profit potential of the master enterprise and its subsidiary but it is impossible due to unavailability of data.

4. DATA DESCRIPTION AND SAMPLE STATISTICS

The survey of Russian industrial enterprises which I use in my research has started several years ago with background research and pilot studies and was actually carried out in the years 1999-2000. The survey was funded by TACIS ACE, the Ruben Rausings Foundation, the MacArthur Foundation, and the Bank of Sweden Tercentenary Foundation. It comprises 530 enterprises from different sectors and regions. Special attention was paid to the sampling technique. Our solution to the problem of regional and intra-regional sample selection was to piggyback on the sampling strategy of a household survey, the Russian Longitudinal Monitoring Survey (RLMS). The RLMS employs a multistage probability sample, starting from a list of 2029 *rayons* serving as Primary Sample Units (PSU). Moscow City, Moscow Oblast, and St. Petersburg City were included with certainty (self-representing strata), while other non-self representing rayons were allocated into 35 equally sized strata. Then 35 rayons were chosen (one from each stratum) with a probability proportional to rayon's size. The target sample was constructed in accordance with the proportion of urban and rural population sizes and ethnic composition (if it was significant). Villages in rural and districts in urban areas served as Second-Stage Units (SSU). Within these areas, dwellings were enumerated and then drawn randomly from a list. One of the little-known aspects of the RLMS is that workers are asked several open-ended questions about the nature of their jobs and employers. In examining the string variables containing those answers, we found that nearly every worker, particularly those employed in manufacturing firms, at one time or another reported the exact name of his or her employer. Our sample consists of the list of these employers. Thus, if the RLMS sample of households is a national probability sample, then our enterprise sample is a national probability sample of manufacturing firms in Russia, drawn with a probability proportional to employment.

RLMS sampling procedure ensured the sample representativeness with respect to geographical and ethnic factors (for large ethnic groups) and level of urbanization. Thus our sample properly represents the enterprises employing Russian people. Large firms were more likely to appear in our sample, because a person in Russia is more likely to work for a large firm. Our sample is biased towards large firms, just as the economy itself is biased towards them.

Let's turn to a description of the sample characteristics by industry, region and size (always bearing in mind that the sample was not designed to represent the true composition). The aim here is to assess the structure of the sample relative to the population estimates available from official

sources, namely Goskomstat statistical yearbooks, which may also suffer from problems of reliability.

Graph 1 shows the distribution of firms by industry for Goskomstat "population" in 1998 and for the sample. The sample appears to be weighted towards firms in the electricity and fuel sectors, while the wood sector is under-represented compared to the Goskomstat figures.

Perhaps because the RLMS sampling procedure contained explicit stratification by region, the sample and population proportions are more closely aligned along this dimension. **Graph 2** shows the distribution of the number of firms by region. The North-West region is over-represented, Far East is under-represented, while other regions appear to be represented rather accurately.

Let's look also at the distribution of firms by size (where size is measured as industrial employment) at **Graph 3**. Our sample is indeed notably weighted towards large firms. If we look at the employment distribution by size (**Graph 4**), we also see that small firms are under-represented. One of the reasons could be the difficulty we met with finding small firms that were not in the registry, as we did not have address information for them. Small firms are also more likely to have been liquidated.

The sample that I use in my analysis consists of 497 firms, which originated and existed in some form before 1986. Sample statistics for this reduced sample – size, industry and ownership distribution - is presented in **Appendix 2**.

Survey covers virtually every aspect of enterprise activity. One part of it contains standard statistical and accounting information which firms report to statistical offices. Another part of questionnaire was designed to trace the evolution of the firm since 1986: its origins, changes in organizational and legal form, ownership structure, and corporate governance mechanisms.

Special part of questionnaire was devoted to reorganizations which firm has undergone in last fifteen years. This is where I can get information about type of reorganization, time when it occurred and the size of resulting employment change. In the **Appendix 1** I present this part of the questionnaire.

5. DESCRIPTIVE ANALYSIS

5.1. Case studies

Before starting formal analysis it is useful to study particular cases of firm reorganizations. Examples will help to better understand the nature of structural changes of Russian firms as they allow to trace history of a firm, specific factors and conditions influencing its structural changes and consequences of these changes. Below I describe two cases when firms underwent multiple reorganizations.

1. Brick plant

The plant produces construction ceramics (bricks). During Soviet period the plant was subordinated to the ministry of construction materials. In 1990 the plant employed 170 employees.

Reorganizations. In September 1991 the plant went to a lease and became a cooperative. In December 1992 it was privatized by the second option (sale of 51 percent of voting shares to the work collective). By 1994 80 percent of the plant was owned by insiders (20 percent - managers, 60 percent - workers). However, during that period financial condition of the firm deteriorated, plant accumulated large wage and tax arrears (in 1994 80 percent of workers had wage arrears).

In April 1997 the firm merged (was acquired) with local private construction firm. In October 1998 the firm spun off another firm. This new firm obtained all the production facilities of the plant. Old firm exists only formally, as a shell firm, but it inherited all the debts of the plant. New firm is now wholly owned by two managers of the construction firm.

Performance. After several years of having negative profit the firm was making positive profits in 1998 and 1999. It employed 100 employees in 1998 and 124 in 1999. All wage arrears were paid off by 1998 though significant part of wage is still paid in kind. Labor productivity, which was falling until 1994, then started to increase and in 1998 it was 16 percent higher than in 1992.

This is a clear case of vertical integration when firm merged with its customer and benefited from it. It is not clear however how organizational factors contribute to the integration. Brick production obviously does not entail much of specificity. Spin-off was not a real change of firm's boundaries. It was used as an instrument to improve firm's financial condition and get rid of the debt.

2. Flax company

The plant produces flax. During soviet period the plant was subordinated to the ministry of textile industry. In 1990 the plant employed 1198 employees, of which 341 in non-production sector.

Reorganizations. In August 1991 the plant was leased by its employees. In June 1992 it was privatized through auction and became a partnership. By 1994 92 percent of the firm was owned by its employees (50 percent - managers, 42 percent - workers). In 1995 the firm was reorganized into open joint stock company.

In August 1997 two enterprises span off from the firm. One is textile company (fire-hose production), second one is "kotelnaya" (boiler-house of a flax company). As a result, employment in the firm" reduced by 10 percent.

In June 1998 the firm further split up into two parts. As a result of split-up, employment of a main successor reduced by 30 percent. Ownership structure of the firm didn't change significantly; in 1999 flax company was still owned by current or former workers of flax company.

Currently all four parts of a former enterprise joined into a holding and continue working together.

Performance. As a result of reorganizations number of employees reduced from 1198 in 1990 to 169 in 1998. Most of non-production divisions (housing, polyclinics, kindergartens) were closed or spun off. At the same time labor productivity measured as a ratio of real sales to employment reduced almost 10 times from 1992 to 1997. During the whole period of 1991-1998 enterprise had wage arrears and starting from 1994 increasing share of wage bill was paid in kind. Share of non-

monetary payments for materials and sales increased from 5 percent in 1994 to 80 percent in 1998. Thus, performance and financial condition of the firm deteriorated.

In this case governance factors could play a role in splitting the firm up. Manager keeping 50 percent of shares may have an interest in shedding unprofitable divisions of a firm. At the same time, the fact that performance deteriorated after reorganization may imply that manager is more interested in acquiring private benefits than in increasing the value of his ownership stake.

5.2. Deciphering reorganizations

As examples above show, reorganizations are quite heterogeneous in nature – it may be real division or combining of assets or it may be, for example, an instrument of transfer of assets from a firm under a threat of bankruptcy. Consequently, careful approach is needed in classifying reorganizations. In the analysis I used not only data from the survey but also information from Goskomstat enterprise registry (employment, name and address information) where possible. I looked at every case of reorganization closely in order classify it properly.

Since I am using data from a survey, it is important to understand what questions were asked and how respondents interpreted them. Types of reorganizations listed in the questionnaire (**Appendix 1**) are legal definitions, taken from Civil Code and JSC Law. Each of these reorganizations involves change of a legal status of one or more participants. I am interested in reorganizations, which involve change of legal boundaries of a firm. There are four of them: split-up, spin-off, merger and acquisition. Note that survey was retrospective, that is, surveyed firm is only one part of some former firm (in case of break-up) or it is a combination of several former firms (in case of integration). In case of spin-off, surveyed firm may be either a firm which was spun-off and re-registered as a new firm or it may be an old firm which span-off some part of it. So, in a question we separate these two types of spin-offs. Further I will name them spin-off (new) and spin-off (old).

It is clear that reorganizations in our definition involve change of legal boundaries of a firm: either one legal entity is separated into several new ones or several legal entities are joined in one. However, what we are interested in is economic processes behind these legal changes. What happened to physical assets of a firm, to its employment? Whether and how its sphere of activity (products produced) changed? What part of production process was excluded or included into new legal boundaries as a result of reorganization? Unfortunately, our data do not allow answering all of these questions but survey asked two additional questions, which will allow us to better understand underlying economic transformations. We asked how employment of a firm changed (increased, did not change, decreased) and by how many percents, as a result of reorganization. This can tell us something about change of economic (physical) boundaries of a firm.

Apparently, firms that underwent split-ups and spin-offs should report fall of employment; firms that merged or acquired another firm should report rise of employment. However, this was not always the case. Sometimes firms that underwent some kind of break-up report no corresponding employment change. One possible explanation is that a firm was previously a member of production association, *trest,* etc. – Soviet industrial associations which comprised large number of

firms in a certain industry. Firm might report exit from this association as a break-up. Apparently, exit from association was not accompanied by change of physical boundaries – it was still the same production unit. Survey asked about old name of a firm back in 1986, similar variable exists in Goskomstat registry. Using this information I was able to determine that out of 22 firms which had break-ups and report no employment change, at least 12 were previously members of some industrial associations. Another explanation comes from one of examples above – a break-up was used as a way to transfer assets from a bankrupt firm, employment obviously didn't change. Such kinds of reorganizations also do not involve change of physical boundaries – same production unit exists under new legal label.

As for cases of mergers and acquisitions with no employment change, they also can be explained. Firm might join a holding, business group etc. – some group of firms or obtain some share in another firm, but it remains and perceives itself as separate legal unit, hence, reports no change in employment. Of course, joining a group or buying ownership share also means changing firm's boundaries to an extent since relations between members of a group differ from relations between independent firms. Clearly, if we understand boundaries of a firm in somewhat broader sense than just legal boundaries, of change in boundaries is a question of degree. Still, it's clear that cases of reorganizations with no employment change should be analyzed separately from others.

Also, there are few cases when break-up was accompanied by increase of employment or integration resulted in decrease of employment. I exclude such cases from further analysis.

Result of methodological discussion above is a classification of types of reorganizations according to legal definition, employment change and number of reorganizations on a single enterprise. It is presented in **Table 1**. 57% percent of firms in my sample did not reorganize since 1986. Among reorganized firms, for the purpose of further analysis I will mainly consider firms with one reorganization and corresponding employment change (five types in bold letters in a table). At least, these groups can be considered more or less homogenous[1]. Around 15% of all firms had several reorganizations since 1986 – of different types in various combinations (for detailed statistics see **Table 2**). I split them into three groups: firms only with break-ups, firms only with integrations and firms with both types. Were possible, I will try to give statistics for these groups too, though it is more difficult to interpret. Technical note: last column of Table 1 contains codes for types of reorganizations. I will use them sometimes in further description for the sake of simplicity.

5.3. Reorganizations by time, industry and size

It is interesting to know how reorganizations were distributed in time. This can be seen from **Graph 5 and Table 3 (**for firms with only one reorganization – five major types). As we can see from the table, while there were some mergers and split-ups before 1991, the process of adjustment of

[1] Even inside these groups reorganizations may be quite different in nature. For example, merger may mean vertical integration up-stream or down-stream, or horizontal integration or diversification. The same for split-ups. Unfortunately, data do not allow to distinguish them.

boundaries of the firms was most active during mass privatization in 1991-1994 and continued after 1994 with the peak in 1997. Note that the number of breakups is greater then the number of mergers almost for all years. It shows that the process of unbundling was more active than the process of integration even after the end of mass privatization, that is, former socialist enterprises were indeed significantly oversized. Rise of integration activity started after 1993.

Industrial structure. Let's see, how reorganizations went on in different industries. General distribution is presented in **Graph 6 and Table 4**. In most industries as well as in whole sample 50-60% firms did not have any reorganizations. Quite similar (and close to general picture – last column) "bundle" and structure of reorganizations are observed in following industries: construction materials, electricity, food processing, light, machine building. Firms in chemical industry, forestry, non-ferrous metallurgy and oil extraction had relatively more spin-offs. Firms in forestry and non-ferrous metallurgy reorganized more in general. Oil extraction industry firms in a sample did not have any integrations. Clearly stand apart ferrous metallurgy and oil refining. Their firms virtually did not reorganize; only one firm in each industry had reorganization with no employment change.

More clearly industrial distribution of five main types of reorganizations can be seen on **Graph 7**. It varies quite notably. Non-ferrous metallurgy disintegrated most actively. Also a lot of break-ups happened in chemical industry, forestry, and oil extraction. Relatively more integrations compared to other industries there were in construction materials, electricity, food processing, and forestry. Three types of multiple reorganizations by industry can be seen at **Graph 8.** Some 6-14% of firms almost in all industries underwent multiple changes of boundaries, both through break-ups and integrations.

Finally, **Graph 9** presents industrial structure of reorganizations with no employment change. Largest category in almost all industries is spin-off (new), which might mean, as discussed above, exit from production association or transfer of assets (or something else). Quite a lot of integration without change of size is observed in construction materials, food processing, light industry, machine building. High share of merger in oil refining is in fact one firm out of four in a sample.

First conclusions that can be drawn from above analysis are following. Almost in all industries process of reorganization was quite widespread, active and varied. Situation looks quite similar in domestically oriented processing industries, while resource-based and exporting industries are specific with respect to reorganizations. There were lots of reorganizations (nonferrous metallurgy) as well as no "real" reorganizations at all (ferrous metallurgy and oil refining).

Employment change. Let's now look at the scale of employment change, which accompanied reorganizations. Were these just minor changes or were significant parts of firms in terms of employment split up, spun off, merged or acquired? **Table 5** shows detailed statistics on two variables: size of firm (employment) in a year preceding year of reorganization and percentage change of employment as a result of reorganization. (One caveat of such analysis is that it's done irrespective of year of reorganization – we summarize statistics across different years.)

As can be see, firms changed their boundaries on a quite significant scale. For all types of reorganizations, employment changed by more than 1/5 on average. In case of split-up, firms on average reduced by almost one half. Interesting results come from the comparison of two types of spin-offs. For the "type 20" firms employment has fallen by 33.5 % on average. This means that 2/3 of an old firm spun off and re-registered as a new firm. At the same time, firms of "type 30" spun of on average 22% of employment. There may be several explanations. Since survey was retrospective and only firms which survived to the moment of survey were able to get to the sample, it looks like larger parts of broken-up firms (irrespective of whether they were "old" or "new") survived more often than smaller parts. Of course, since sample is initially weighted by employment, larger firms had in general higher probability to get into the sample. Unfortunately, we will not receive complete picture from this data, since we did not survey the whole population of broken up firms. Still, it is clear that disintegrations went on a large scale - firms reduced their size quite dramatically.

Scale of integration activity was also quite pronounced – firms merge on average with firms of more than 60% of their size and acquired firms of 1/5 of their size.

When talking about size of firms, it's important to remember that firms changed their employment not only through reorganizations but also through lay-offs. Let's look at the yearly dynamics of employment for different types of firms, **Graph 10 and Graph 11**. In Graph 10 employment numbers from registry are used (PPP) – they cover more years (since 1985) but have fewer observations since I included observations where employment in 1985 is non-missing. Graph 11 was build using employment figures from survey (total employment, including non-production divisions), properly cleaned. They have more observations and cover years 1990-1998.

Interestingly, both graphs show that firms which had one reorganization, whether break-up or integration, were initially smaller than firms with no reorganizations. At the same time, non-reorganized firms reduced their employment approximately with the same speed as split-up firms. In firms that had merger or acquisition employment stayed almost unchanged during the whole period. It means that layoffs where quite significant for all types of firms. Firms, which did not change their boundaries through reorganizations, changed them by reducing number of employees. Among firms with multiple reorganizations, at least firms with only breakups where initially substantially larger than others and reduced their size dramatically. Still, by 1999 they were on average larger than other types of firms.

6. FACTORS OF STRUCTURAL CHANGE: TESTING THE HYPOTHESES

6.1. Reorganizations

Summary statistics presented in the previous section shows that change of boundaries in Russian industrial sector was a process of large scope and scale. However, descriptive statistics do not yet explain the factors of reorganizations. Indeed, reorganizations took place in all industries, though

with some differences. Variations in other characteristics also do not allow us to draw conclusions about factors of reorganizations. In this section I test the hypotheses proposed earlier.

Description of variables that were proposed in section 3 as factors of reorganizations is presented in Appendix 3 and Table 6 presents summary statistics. First of all, let's look at means of variables by type of reorganization in Table 6. There is variation in the average value of variables measuring organizational factors (in particular for firms that had integration) though the direction of variation is opposite to what initial hypotheses predict. In particular, integrated firms had much less concentrated market for main input on average than non-reorganized firms while lock-in effect hypothesis predicts the opposite effect. Also integrated firms can be found in the industries which higher average level of competition measured by Herfindahl-Hirschman index, export dummy and import penetration level. This implies that firms integrated with the purpose of limiting competition. Governance factors show some variation as well, most notably, managerial ownership share is much higher for the firms that had split-up or spin off.

In order to see whether these effects are significant I run regressions. Inclusion of all factors into one regression is problematic since number of observations in each category, in particular for integrations, is low; hence large number of variables reduces degrees of freedom significantly. Instead, I run multinomial logit regression separately for each variable controlling for industry and size of firm (measured by employment in 1990). Coefficients from multinomial logit regression (for two types of reorganizations) and from probit (for all reorganizations pooled together) for each variable are presented in Table 8. Among all the variables measuring the extent of specificity, complexity and lock-in effect which would call for vertical integration only the dummy for new supplier is significant for integrations. According to initial hypothesis ability to find new supplier means that firm is not locked into a relation with old supplier, hence has less incentives to integrate. The effect I find is however the opposite: ability to find new suppliers is positively correlated with integration. However, the ability to find new supplier may be in turn by the same factors as the incentives to integrate or disintegrate. In other words, finding new suppliers also in a way leads to change in boundaries of a firms though in a weaker sense than change of legal boundaries. Consequently the problem of endogeneity doesn't allow us to rely on the result obtained.

At the same time, the degree of complexity, concentration of input markets, barter and innovation activity do not appear to be factors of reorganizations. This doesn't mean that transaction cost theory explanation for vertical integration is not working in transition economies. Since in my data it is not possible to distinguish between vertical and horizontal integrations or disintegrations, the effect of organizational factors may not show itself. In order to reveal the importance of organizational factors I will look specifically at vertical integration in the next sub-section.

As for the market structure factors, the initial concentration on the product market decreases the probability of integration. In other words, firms in more competitive markets integrate more, probably in order to limit competition and gain monopoly power. On the other hand, firms facing competition from imports are more likely to break up. Interpretation might be that firms competing with import goods cut off inefficient divisions or downsize to an optimal size (evidence of

oversized former soviet firms) in order to be able to face import competition. Thus, competition with domestic firms leads to integration while competition with imports disciplines firms and leads them to reduce the boundaries.

The most significant factor of reorganizations can be found among governance factors. The higher managerial ownership stake leads to higher probability of break-up. Manager who holds ownership stake in a firm has more incentives and/or more opportunities to reorganize a firm. In theory, manager-owners have better incentives to increase firm value. Hence, these split-ups could be value-enhancing, for example, manager could separate unprofitable parts of firm. However this effect is non-linear and managers cares not only about value of a firm but also about private benefits. Thus, through break-ups manager could separate the division with higher opportunities for private benefits extraction. In order to better understand the role of managers let‘s look at managerial turnover during and after reorganizations. Statistics is presented in a table.

Type of reorganization	Percent of firms where manager changed with reorganization	Percent of firms where manager didn’t change after reorganization		Total number of firms
		if changed with reorganization	if didn't change with reorganization	
Split-up	52.6	50.0	66.7	19
Spin-off (new)	50.0	58.3	66.7	28
Spin-off (old)	19.4	33.3	68.0	31
Merger	71.4	20.0	100.0	7
Acquisition	12.5	0.0	85.7	8
Total	37.6	53.2	72.2	133

	Privatized firms that reorganized between 1994 and 1999	Privatized firms that didn’t reorganize
Managerial ownership in 1994	13.96	10.18
Managerial ownership in 1999	20.33	11.76

From the first panel we can see that in case of split-up or spin-off (new) manger changed in half of the cases while in case of spin-off (old) manager changed only in 20 percent of firms. Merger is associated with much higher rate of managerial turnover indicating that these could be hostile takeovers while during acquisition managers changed rear. Importantly, managers who survived reorganization were also more likely to stay in a firm afterwards meaning that they were more

entrenched. In we compare managerial ownership for firms that reorganized between 1994 and 1999 with that of non-reorganized firm (second panel) we can see that managers of reorganized firms both had higher ownership stake before reorganization and were able to increase it more through reorganization. Thus, one of the reasons of reorganization might be the desire of manager to increase his ownership stake in a firm. Manager holding on average 20 percent of a firm in 1999 doesn't necessarily care about increasing the value of the firm but is entrenched enough to be able to siphon value out of the firm or extract private benefits. This finding is consistent with the findings from other transition economies (Czech Republic and Macedonia) about the important role of managers in changing boundaries of the firms. The effect of reorganizations on firms' performance is briefly discussed in the last section.

6.2. Vertical Integration

Factors suggested by transaction costs theory turned out to be insignificant for reorganizations. This might be due to the fact that analysis of reorganization mixes together vertical and horizontal integrations/disintegrations since data do not allow to distinguish them. In order to study the impact of proposed factors on vertical integration specifically I in this section I take broader perspective. I relax definition of boundaries of a firm as legal boundaries only and look at vertical integration through ownership.

Ownership ties between firms started to form during and after mass privatization. Even though large art of ownership was privatized to insiders outside firms could by some stakes in other firms through tenders and auctions or accumulate stakes on the secondary market. Why did some firms have chosen to buy an ownership stake in their suppliers or customers while other did not? Transaction cost theory and property rights theory can help to answer this question.

The survey data contains information about ownership structure, in particular, the ownership stakes and identity of outside blockholders (those who have 5 percent stake or more). Thus, for each firm in a sample we know whether its supplier or customer held a stake in this firm. There are 39 firms in a sample which had suppliers among blockholders and the average stake held by suppliers in 1999 is 34.4 percent. Among them 24 firms had suppliers holding more than 25 percent. Another 39 firms were partly or fully owned by their customers. Average stake held by customers in 1999 in those firms is 36 percent. Few firms were had both supplier and customer owners. Thus, more than 60 firms in a sample had some degree of vertical integration, either with upstream or downstream firms.

In order to test the importance of organizational factors I run binomial probit with the dependent variable being the dummy for presence of supplier or customer blockholder. Taking size of ownership stake as the dependent variable instead produces similar results. I run the regressions separately for suppliers and customers since different factors may affect upstream and downstream integration. I control for industry and size and industry variation can also tell us something about the factors of integration. The results of two regressions are presented in Table 9.

Most interesting results come from the regression for supplier blockholders. Most variables of interest are significant but have opposite effect to the one predicted by the initial hypotheses.

Complexity index has negative effect on probability of integration with supplier. I don't have a sound explanation for that. Concentration on input and product markets has negative effect on probability of integration with supplier. Another hypothesis was that higher concentration on input and product market would lead to higher degree of dependency between firms and possibility of opportunism, hence, firms have higher incentive to integrate. However the observed effect is opposite. Concentration on input and product markets has negative effect on probability of integration with supplier (note that I am using gini coefficient to measure competition on product market as it is highly significant while HHI is not). Firms on facing more competitive input and product markets integrate more which may have a goal of limiting competition instead of economizing on transaction costs.

On the other hand, presence of innovation activity in the firm measured by patents obtained has significant positive effect on probability of integration with supplier. Having innovation patents means that firm produces some kind of specific products not produced elsewhere. This is the only firm-level measure of asset specificity available in my data. Firm that produces specific products may behave opportunistically which calls for vertical integration. This is the only evidence from my data confirming transaction cost theory hypothesis. Coefficients of the industry dummies show that firms in metallurgy and construction materials industry have higher propensity to integrate with suppliers.

Regression for customer blockholders has much lower explanatory power than previous one. Presence of barter payments with customers has positive effect on integration which is in accord with initial hypothesis though the size of effect is quite small. Contrary to previous equation concentration on the product market has positive effect on integration with customers though it is only marginally significant.

Summarizing, analysis of vertical integration shows that it was both a method to internalize transaction costs arising from asset specificity and a way to reduce competitive pressure.

7. PERFORMANCE AFTER REORGANIZATIONS

Finally, let's look at how performance of the firms was changing after reorganizations. Since our firms are mostly non-traded firms, the most reliable measure of performance is labor productivity. Profit figures are less reliable, besides, they are less reported, both in Goskomstat and in our survey.

I conduct kind of event study, comparing (log of) labor productivity relative to industry average for different types of reorganizations in a year before reorganization, year of reorganization and three years after reorganization (**Graph 12** is built for 36 firms which had these data).

In a year before reorganization, firms that were going to have a spin-off had significantly higher relative productivity than all others. After the break-up all firms experience fall of productivity relative to industry average. Only integrated firms increase their productivity to the pre-

reorganization year. After that, all types of firms decrease their productivity. Among spin-off firms, both master enterprises and subsidiaries (spin-off (old) and spin-off (new)) show similar trends. Integrated firms perform relatively better; split-up firms have worst results. For comparison, labor productivity relative to industry average for firms with no reorganizations was continuously falling from 1991 to 1998 (**Graph 13**).

Finally, let's compare productivity of firms at the end of observed period – in the year 1998.

Types of reorganizations	Log of labor productivity in 1998		Deviation from industry average (in logs) in 1998		Percent of firms where labor productivity exceeds industry average
	mean	sd	mean	sd	
No reorganization	1.30	1.07	-1.09	1.13	14.48
Split-up	1.03	1.04	-1.12	0.52	12.50
Spin-off (new)	1.44	1.08	-0.70	0.99	20.00
Spin-off (old)	1.90	1.21	-0.63	1.09	21.05
M&A	1.87	0.59	-0.50	0.86	18.18
Several break-ups	0.88	1.11	-1.26	1.02	9.09
Both break-ups and integrations	0.93	1.01	-1.17	1.14	12.50
Total	1.36	1.08	-1.02	1.10	15.33

Productivity of non-reorganized firms is close to sample average. Among all reorganization types, better performing firms are those which had one integration and those which experienced spin-off (both master and subsidiary, though master enterprises perform better than subsidiaries). Importantly, this result doesn't mean that after spin-offs both master enterprises and subsidiaries performed better on average. It means that in our sample we captured better performing master enterprises and better performing subsidiaries. Combined with the fact that our sample is biased towards larger firms, this may lead to the conclusion that larger parts of spin-off firms performed better. Variation in productivity is highest for master enterprises.

The worst performing firms in a sample are those which resulted from split-ups and those which experienced several reorganizations. Note that according to regression results split-up firms had lower productivity before reorganization as well. Thus, split-up did not help them to improve performance.

Finally, if we pool all three types of break-ups together and compare labor productivity of these firms with non-reorganized firms, statistical tests show that both mean and standard deviation of labor productivity in 1998 for split-up or spin-off firms are significantly larger than those for non-reorganized firms.

8. CONCLUSIONS

The process of structural changes in firms' boundaries is understudied since very little evidence is actually available on this issue. Our data do not allow addressing all the questions of interest in this respect, however, following conclusions can be drawn from above analysis:

- Reorganizations of Russian firms were heterogeneous in nature
- Firms changed their boundaries on a large scale – 40-50% of firms almost in all industries had at least one reorganization since 1986. 15% of firms underwent multiple reorganizations.
- Due to the fact that Soviet firms were significantly oversized there were much more break-ups than integrations.
- Reorganizations resulted in quite significant change of size of firms – employment changed on average by more than 20 %

Based on a modern theory of a firm, I proposed several factors to determining reorganizations of Russian firms, among them organizational, market structure and governance factors. Following factors are found to be significant:

- Firms in less concentrated industries integrated more thus limiting competitive pressure from domestic firms
- Firms facing strong competition from, imports disintegrated more; that is, competitive pressure from import forced firms to downsize and spin off inefficient divisions.
- Firms where managers hold larger ownership stakes split up more; thus interests of managers played very important role in reorganizations of Russian firms which is consistent with findings for other transition economies.

Organizational factors turned out to be insignificant for reorganizations. The reason might be that data do not distinguish between vertical and horizontal vertical reorganizations while the factors I propose have to do with vertical relations between firms. I further test the importance of these factors for vertical integration with suppliers and customers through ownership holding. I find that complexity of production and concentration on input and product markets are negatively correlated with integration with suppliers contrary to hypotheses suggested by organizational theory. At the same time, asset specificity measured by innovation activity of a firm leads to more integration with suppliers. This is the only evidence in support of transaction cost theory.

Finally, I attempted to study the effect of reorganizations on firm performance. Simple comparison of labor productivity levels shows that this effect is not always positive. In our sample, firms resulting from spin-offs (both master enterprises and subsidiaries) perform better than non-reorganized firms. Integrated firms also perform better as well. At the same time firms resulting from split-ups and from several reorganizations perform worse than non-reorganized firms. More comprehensive analysis of the effect of reorganizations on firm performance is beyond the scope of this paper and may become a subject of a separate study.

APPENDICES, GRAPHS AND TABLES

A1. Questions asked about reorganizations

11-15. STARTING FROM 19[ ][ ] YEAR **(READ YEAR FROM POSITION 1 OF THE INSERT)**, LET'S TALK ABOUT REORGANIZATIONS OF YOUR ENTERPRISE, IN CHRONOLOGICAL ORDER, STARTING WITH THE VERY FIRST ONE. **/INTERVIEWER! ASK QUESTIONS 11-15 FOR EVERY SUBSEQUENT REORGANIZATION./**

	# of reorganization						
	1st	2nd	3rd	4th	5th	6th	7th
11. type of reorganization							
1. split-up	1	1	1	1	1	1	1
2. merger (involves legal registration of a new legal entity based on two or more predecessors)	2	2	2	2	2	2	2
3. spin-off, your enterprise is the one which spun off and there was its **legal registration** as a new legal entity	3	3	3	3	3	3	3
4. spin-off, your enterprise is the one from which an enterprise was spun off and there was **no legal re-registration** of your enterprise	4	4	4	4	4	4	4
5. acquisition	5	5	5	5	5	5	5
6. reorganization of legal entity of one type to another type (change of legal form) without any of the above changes	6	6	6	6	6	6	6
7. other, please enlist	7	7	7	7	7	7	7
12. in what year did this reorganization happen?	19_ _	19_ _	19_ _	19_ _	19_ _	19_ _	19_ _
13. in what, approximately, month did this reorganization happen?	__ __	__ __	__ __	__ __	__ __	__ __	__ __
14. as a result of this reorganization did the number of employees increase, did not change, or decrease?							
1. increase	1	1	1	1	1	1	1
2. did not change	2	2	2	2	2	2	2
3. decrease	3	3	3	3	3	3	3
4. difficult to say	4	4	4	4	4	4	4
15. By how many percent did the employment increase/decrease only because of this reorganization ***(take the number of employees before this reorganization as 100%)***	%	%	%	%	%	%	%

A2. Summary Statistics for the Sample of 497 Firms

Size Distribution of Firms in a Sample (percents)

Number of employees	Years		
	1990	1994	1998
Less then 100	5.83	7.65	16.14
100-249	12.94	19.79	19.52
250-999	29.45	27.70	31.33
1000-9999	42.07	38.79	29.16
More than 10000	9.71	6.07	3.86
Total number of firms	309	379	415

Distribution of Firms by Industry

Industry	Percent
Chemical	5.03
Coal	0.40
Construction materials	7.04
Electricity	7.65
Ferrous metallurgy	2.21
Food processing	14.08
Forestry	5.03
Fuel	0.20
Gas	0.20
Light	9.66
Machine building	38.03
Non-ferrous metallurgy	2.01
Oil extraction	0.80
Oil refining	0.80
Other	6.84
Total number of firms	497

Distribution of Firms by Ownership Type (percents)

Ownership category	Year	
	1994	1999
100% state	23.14	16.08
Majority state	7.21	6.19
Majority private	25.98	16.29
100% private,		
of which:	43.45	61.24
Majority insider	32.31	31.96
Majority outsider	10.04	27.84
Number of firms	458	485

A3. Variable Description

Complex is Blanchard and Kremer's industry-level complexity/specificity index (square root of sum of squared shares of inputs in production).

New_supplier is a dummy equal to 1 if a firm had "new" suppliers (those who were not suppliers in 1990) in 1994 or 1998, 0 if 100% were old suppliers both in1994 and 1998.

Barter94 is the share of non-monetary payments in sales in 1994

Patent98 is the dummy variable indicating if firm received any patents in 1998

Emp_log90(98) is the logarithm of number of employees in 1990 (1998)

Laborpro90 is labor productivity in 1990

Labpro_logdif90 is equal to: log of firm labor productivity in 1990 minus log of industry average labor productivity in 1990 (labor productivity is measured as the ratio of real output to employment)

Profit92 – profit to output ratio in 1992

Manager_sh94 is share of manager in firm's ownership in 1994, in percents

State_sh94 is share of state in firm's ownership in 1994, in percents

Export is a dummy equal to 1 if a firm was exporting its products in 1990, 1994 or 1998, and 0 otherwise.

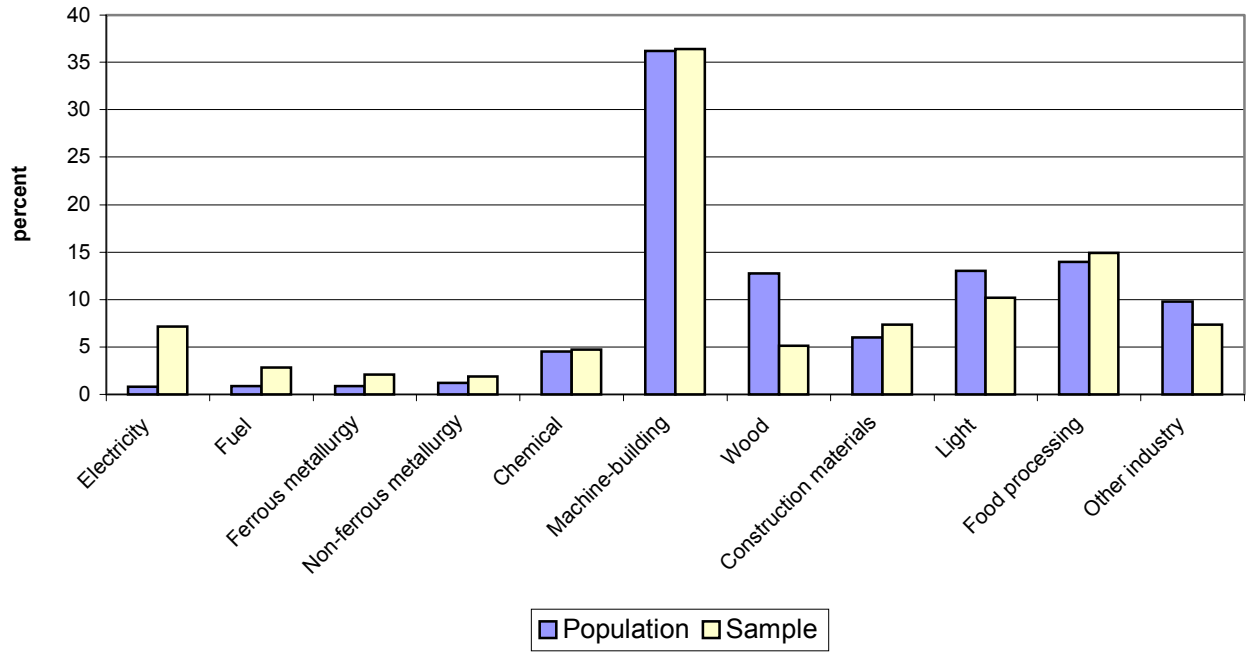
Import – import penetration measured by the share of import in the industry averaged over years 1993 to 1999

Hhi90 is the Herfindahl-Hirschman index (sum of squared output shares of each firm in the industry) for the five-digit industry at the national level in 1990 [2].

Gini97 is the gini coefficient for firms' size distribution (measured by employment) for the five-digit industry at the national level in 1997.

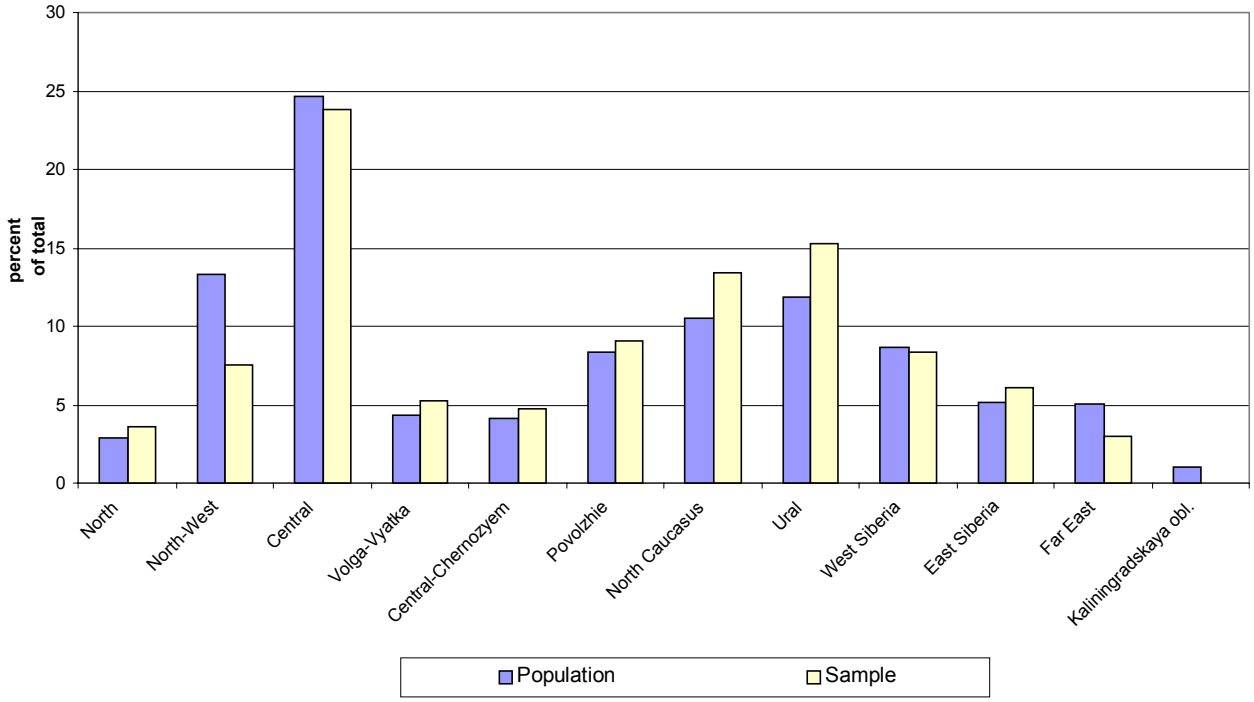
Hhi_input92(96) is the Herfindahl-Hirschman index for the five-digit industry at the national level in which firm's main input is produced. (In a survey we asked respondent to name an input (among raw materials) which has highest share in costs of production. Classifying these inputs into 5-digit industries, it is possible to measure degree of competition on the market for the firm's main input.)

Graph 1
Distribution of Firms by Industry

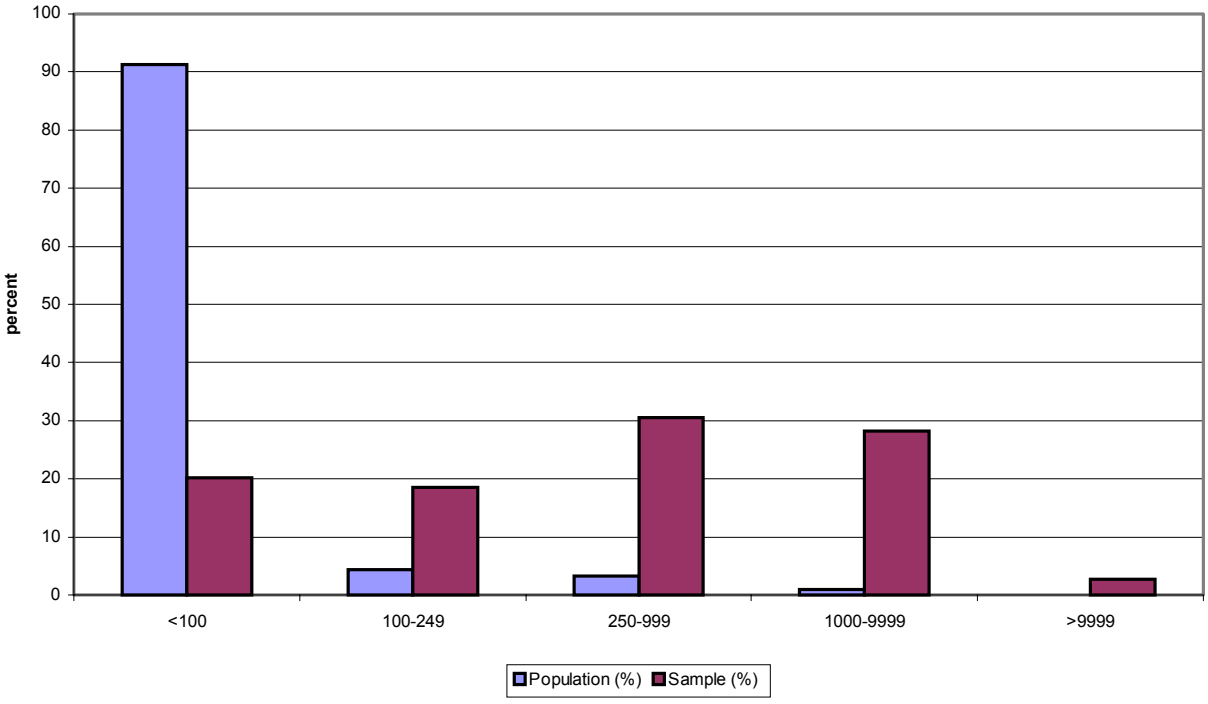


[2] HHI and GINI were constructed by Brown and Earle [4].

Graph 2
Distribution of Firms by Region



Graph 3
Distribution of Firms by Size



Graph 4
Distribution of Industrial Employment by Size

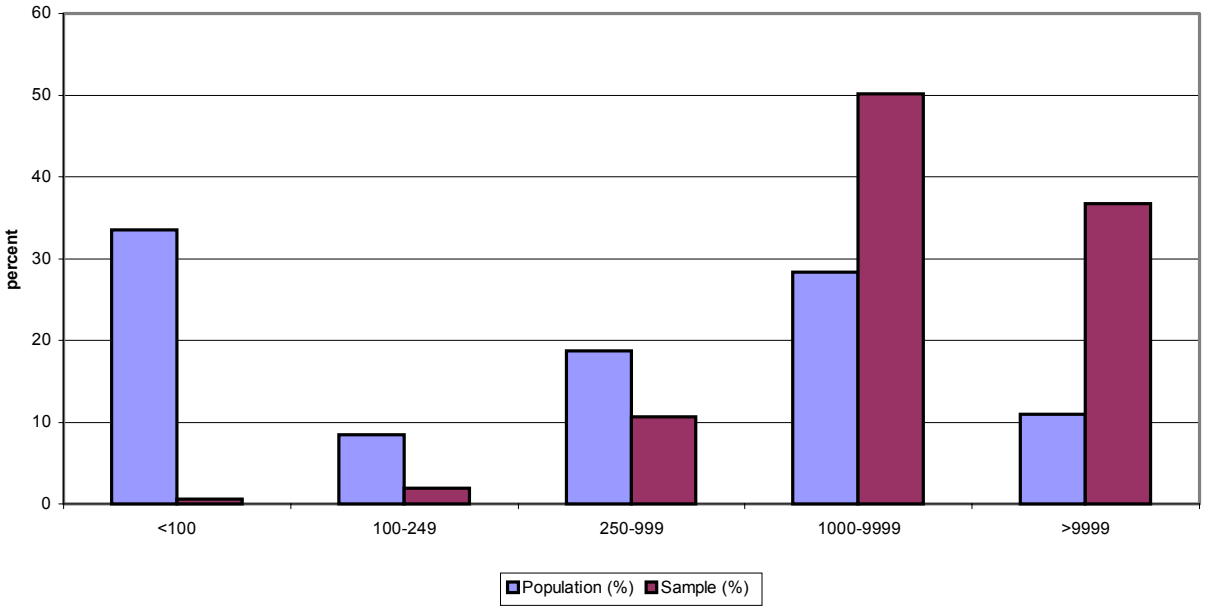


Table 1. Classification of Reorganizations.

Type of reorganization	Number of firms	Percent of firms	*Code of reorganization*
No reorganization	285	57.34	*0*
One split-up, employment decreased	**19**	**3.82**	***10***
One split-up, employment did not change	1	0.20	*11*
One spin-off (surveyed firm is the one which spun off and there was its legal registration as a new legal entity), employment decreased	**30**	**6.04**	***20***
One spin-off (surveyed firm is the one which spun off and there was its legal registration as a new legal entity), employment did not change	18	3.62	*21*
One spin-off (surveyed firm is the one which spun off and there was its legal registration as a new legal entity), employment increased	*5*	*1.01*	*22*
One spin-off (surveyed firm is the one from which a firm was spun off and there was no legal re-registration of surveyed firm), employment decreased	**31**	**6.24**	***30***
One spin-off (surveyed firm is the one from which a firm was spun off and there was no legal re-registration of surveyed firm), employment did not change	3	0.60	*31*
One spin-off (surveyed firm is the one from which a firm was spun off and there was no legal re-registration of surveyed firm), employment increased	*2*	*0.40*	*32*

Type of reorganization	Number of firms	Percent of firms	*Code of reorganization*
One merger (involves legal registration of a new legal entity based on two or more predecessors), employment increased	**7**	**1.41**	***40***
One merger (involves legal registration of a new legal entity based on two or more predecessors), employment did not change	4	0.80	*41*
One merger (involves legal registration of a new legal entity based on two or more predecessors), employment decreased	*3*	*0.60*	*42*
One acquisition, employment increased	**8**	**1.61**	***50***
One acquisition, employment did not change	4	0.80	*51*
One acquisition, employment decreased	*3*	*0.60*	*52*
Several split-ups and spin-offs	29	5.84	*60*
Several mergers and acquisitions	3	0.60	*70*
Several split-ups, spin-offs, mergers and acquisitions	42	8.45	*80*
Total	497	100.00	

Table 2. Firms with several reorganizations.

Number of reorganizations in one firm					Total number of reorganizations in one firm	Number of firms of this type
Split-up	Spin-off (new)	Spin-off (old)	Merger	Acquisition		
2					2	3
	2				2	4
		2			2	5
				2	2	1
		3			3	3
				3	3	1
1	1				2	6
1		1			2	1
	1	1			2	5
1	1	1			3	1
1		2			3	1
2	2				4	1
1	3				4	1
			1	1	2	1
1			1		2	5
	1		1		2	5
		1	1		2	5
1				1	2	5
	1			1	2	4
		1		1	2	8

Number of reorganizations in one firm					Total number of reorganizations in one firm	Number of firms of this type
Split-up	Spin-off (new)	Spin-off (old)	Merger	Acquisition		
1	1		1		3	3
	1		2		3	1
1		1	1		3	1
		2	1		3	1
	1		1	1	3	1
	2			1	3	1
1		1		1	3	1
2	1			1	4	1
4		1		1	6	1
1		3		2	6	1

Graph 5

Number of Reorganizations (for firms with only one reorganisation)

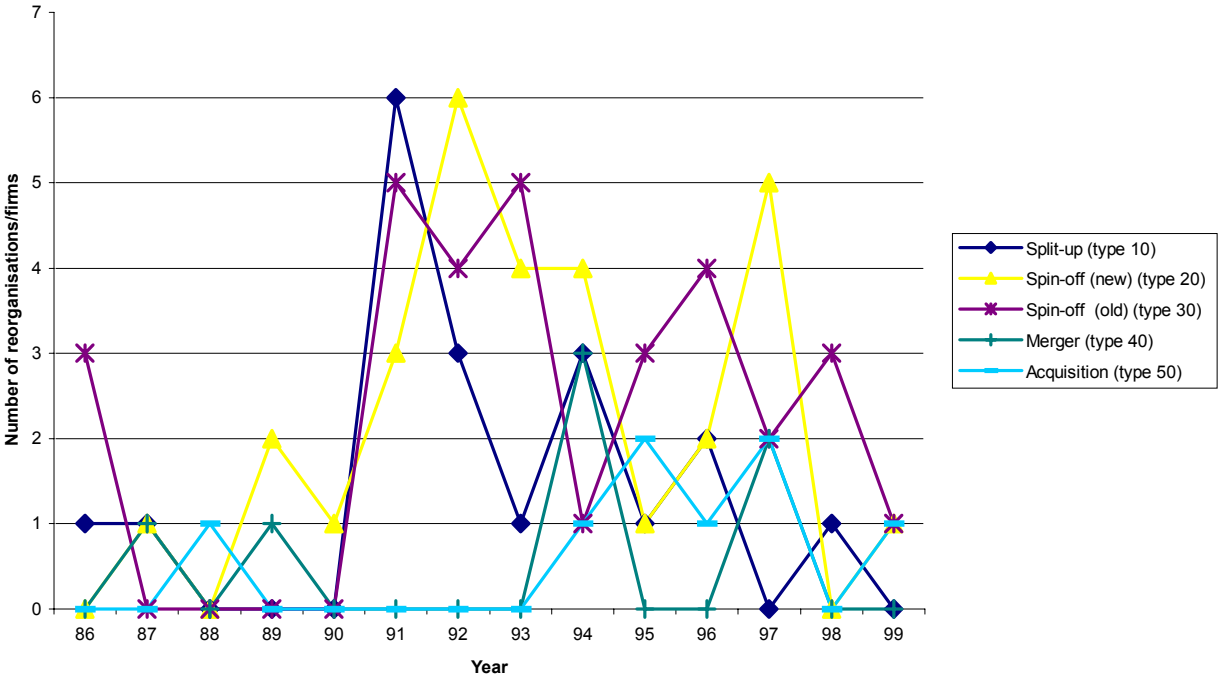


Table 3. Number of Reorganizations by Year.

Year of reorganization	Type of reorganization													
	10	11	20	21	22	30	31	32	40	41	42	50	51	52
1986	1	0	0	0	0	3	0	0	0	0	0	0	1	0
1987	1	0	1	2	0	0	0	0	1	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	1	0	0
1989	0	0	2	3	1	0	0	0	1	0	0	0	0	0
1990	0	0	1	1	0	0	0	0	0	0	0	0	0	0
1991	6	0	3	2	2	5	0	0	0	0	0	0	0	0
1992	3	0	6	4	0	4	0	0	0	2	0	0	0	0
1993	1	0	4	3	0	5	1	1	0	0	0	0	3	1
1994	3	0	4	0	0	1	0	0	3	1	2	1	0	1
1995	1	0	1	0	0	3	0	0	0	0	1	2	0	0
1996	2	0	2	0	0	4	1	1	0	0	0	1	0	1
1997	0	0	5	0	1	2	0	0	2	0	0	2	0	0
1998	1	1	0	0	0	3	1	0	0	0	0	0	0	0
1999	0	0	1	3	1	1	0	0	0	1	0	1	0	0

Graph 6

Distribution of Types of Reorganisations by Industry

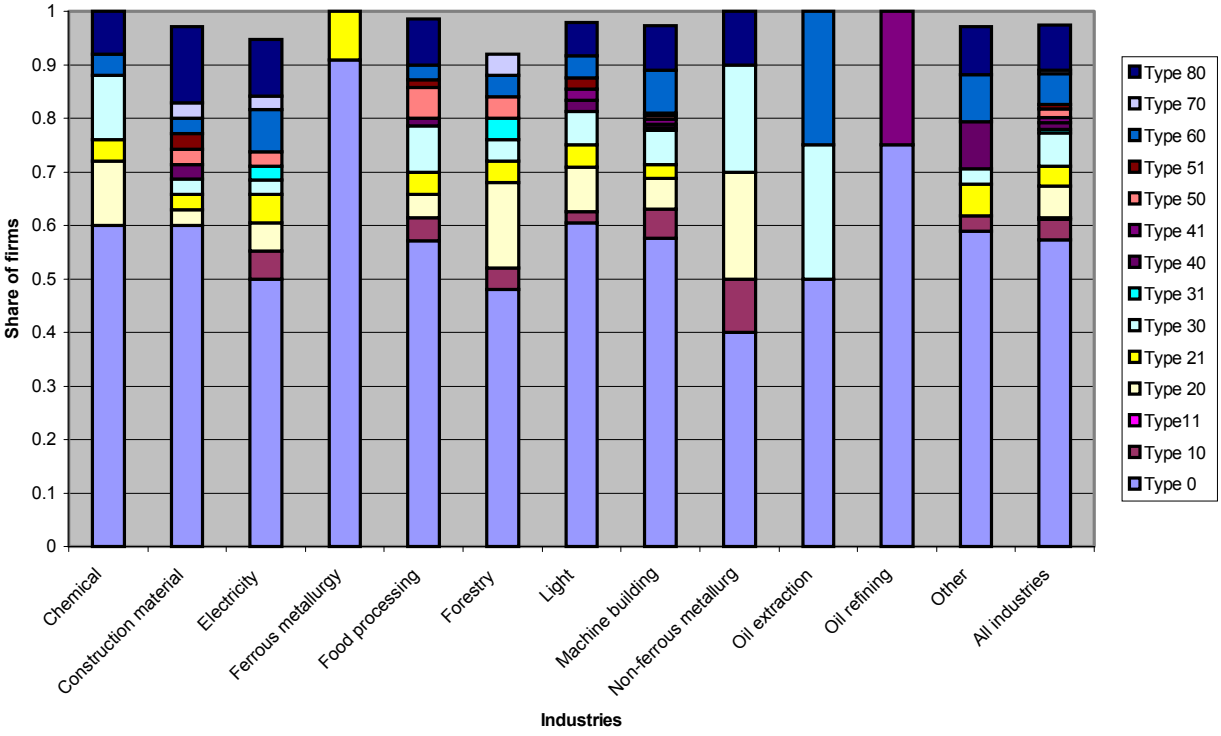
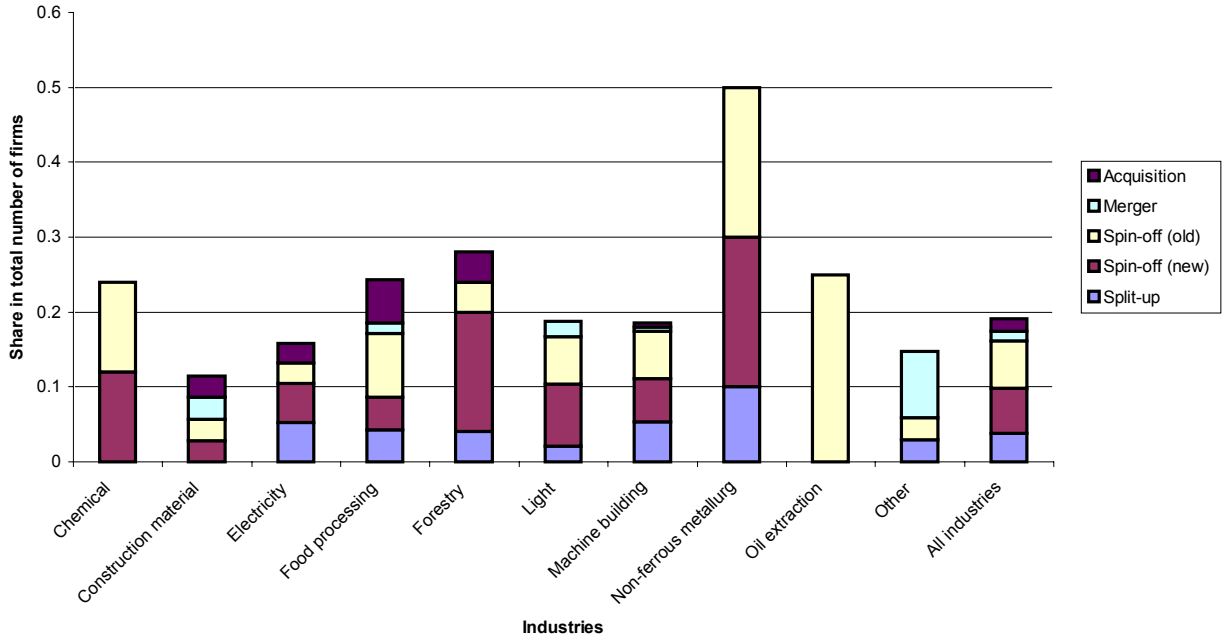


Table 4. Distribution of Types of Reorganizations by Industry.

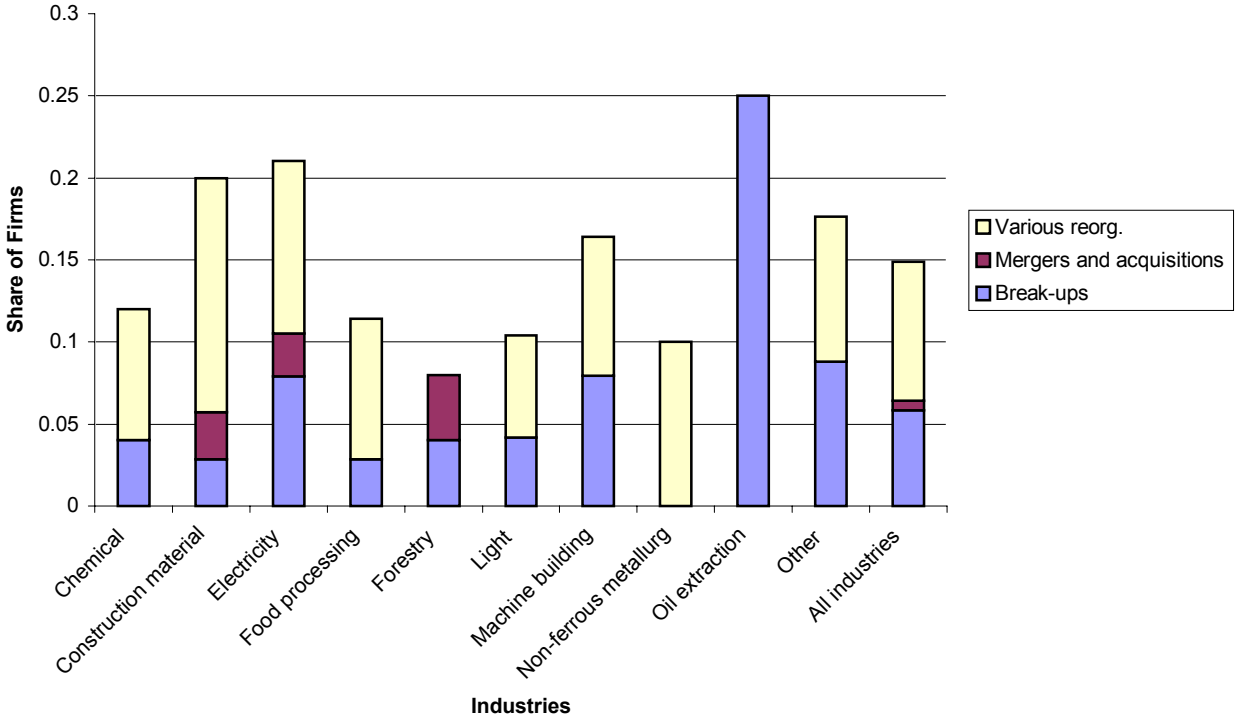
Industry	Type of reorganization														
	0	10	11	20	21	30	31	40	41	50	51	60	70	80	Total
Chemical	15	0	0	3	1	3	0	0	0	0	0	1	0	2	25
Coal	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Construction material	21	0	0	1	1	1	0	1	0	1	1	1	1	5	35
Electricity	19	2	0	2	2	1	1	0	0	1	0	3	1	4	38
Ferrous metallurgy	10	0	0	0	1	0	0	0	0	0	0	0	0	0	11
Food processing	40	3	0	3	3	6	0	1	0	4	1	2	0	6	70
Forestry	12	1	0	4	1	1	1	0	0	1	0	1	1	0	25
Fuel	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Gas	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Light	29	1	0	4	2	3	0	1	1	0	1	2	0	3	48
Machine building	109	10	0	11	5	12	1	1	2	1	1	15	0	16	189
Non-ferrous metallurgy	4	1	0	2	0	2	0	0	0	0	0	0	0	1	10
Oil extraction	2	0	0	0	0	1	0	0	0	0	0	1	0	0	4
Oil refining	3	0	0	0	0	0	0	0	1	0	0	0	0	0	4
Other	20	1	0	0	2	1	0	3	0	0	0	3	0	3	34
Total	285	19	1	30	18	31	3	7	4	8	4	29	3	42	497

Graph 7
Distribution of Reorganizations by Industries



Graph 8

Firms with Multiple Reorganizations, by Industry



Graph 9

Reorganizations without Employment Changes

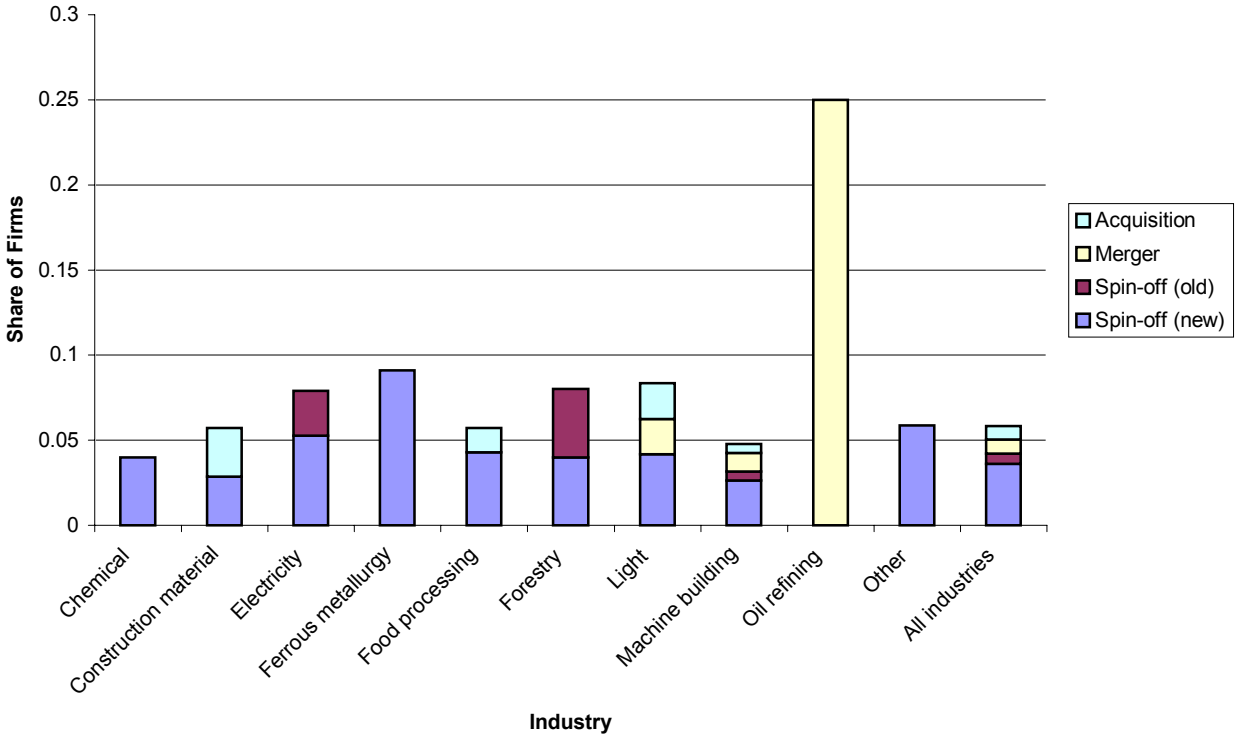
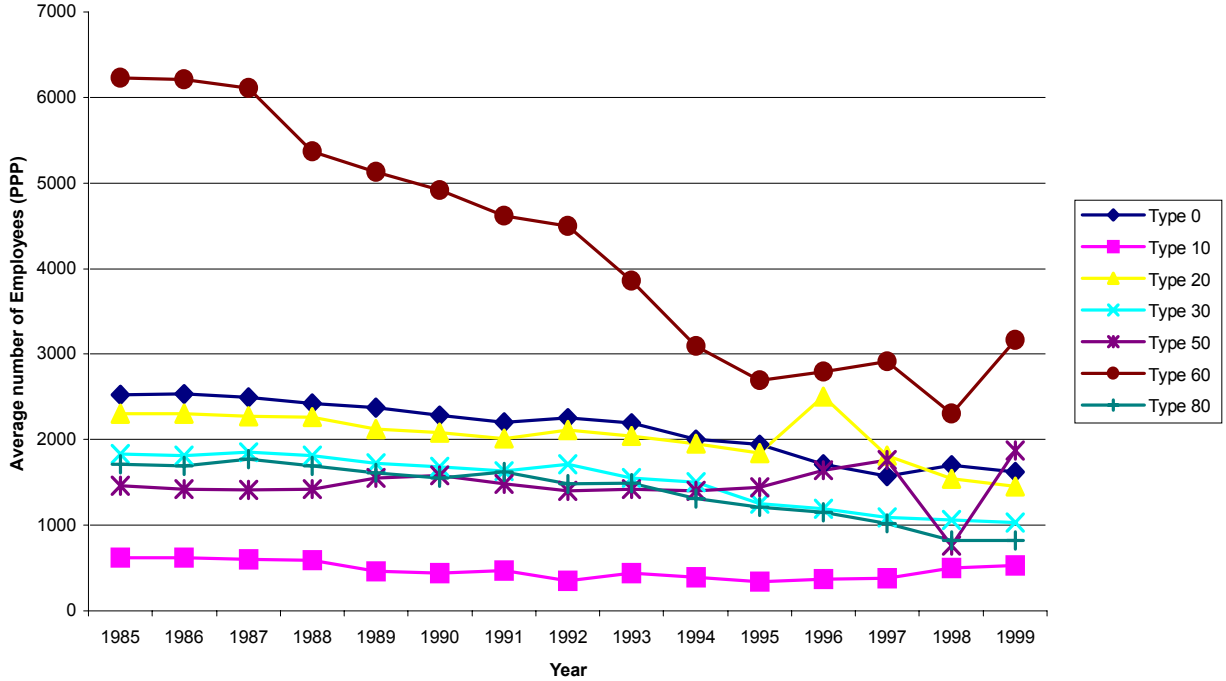


Table 5. Employment Change with Reorganization.

Type of reorganization	Variable	mean	sd	min	p10	p50	p90	max	N
Split-up	Empl_before	2363.1	3708.9	168	231	601	7932	12248	13
	Employment change, %	-43.5	27.4	-81	-80	-50	-7	-4	15
Spin-off (new)	Empl_before	1392.5	1724.6	48	76	1173	3038	7509	22
	Employment change, %	-33.5	18.3	-75	-60	-30	-10	-10	26
Spin-off (old)	*Empl_before*	*6403.8*	*21153.8*	*43*	*176*	*1308*	*6593*	***107226***	*25*
	Employment change, %	*-22.1*	*21.9*	*-95*	*-65*	*-15*	*-4*	*-2*	*26*
	empl_before	2202.8	2561.7	43	176	1201	5300	10833	24
	Employment change, %	-22.2	22.3	-95	-65	-15	-4	-2	25
Merger	*Empl_before*	*1636.4*	*2775.6*	*108*	*108*	*160*	*6528*	*6528*	*5*
	Employment change, %	*119.5*	*145.7*	*8*	*8*	*68*	*400*	***400***	*6*
	empl_before	1636.4	2775.6	108	108	160	6528	6528	5
	Employment change, %	63.4	54.2	8	8	35	139	139	5
Acquisition	Empl_before	1797.2	2497.8	505	505	562	6785	6785	6
	Employment change, %	21.3	16.4	2	2	20	50	50	7

Graph 10

Employment Dynamics (from registry) by Type of Reorganisation



Graph 11

Employment Dynamics (from survey) by Type of Reorganisation

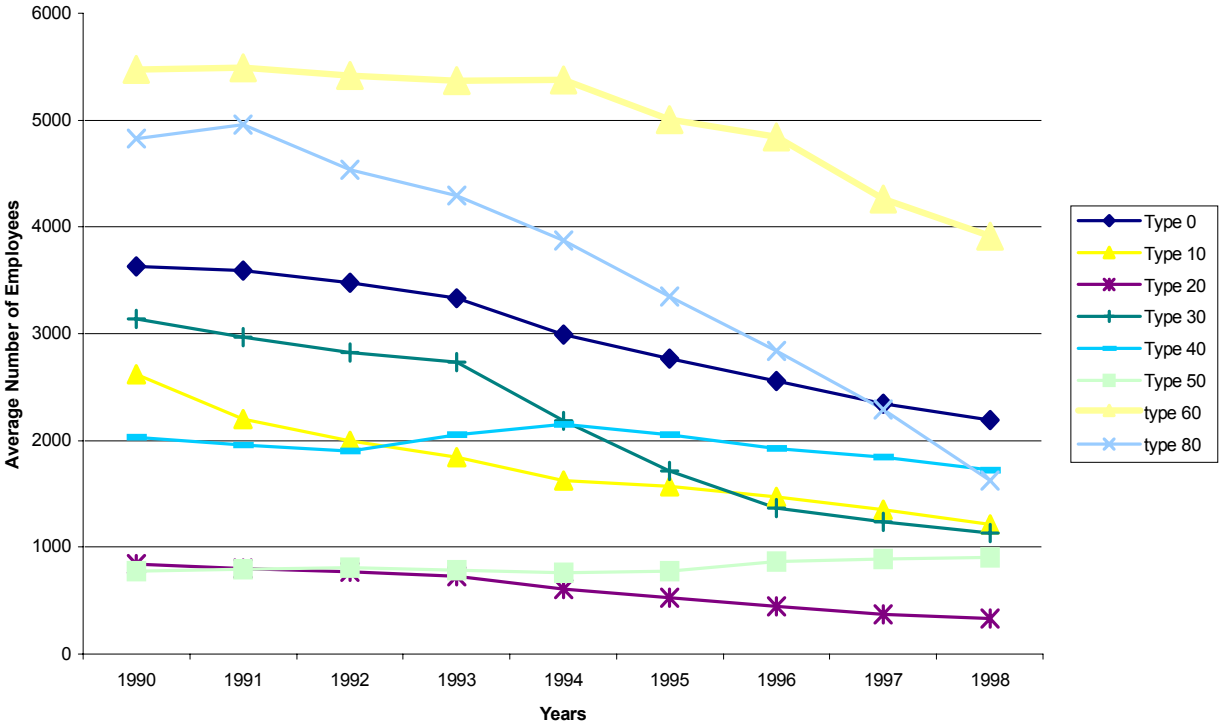


Table 6. Summary statistics.

Variable	Mean by type of reorganization:				mean	sd	min	p50	max	N
Organizational:	no reorg	break-up	Integration	Multiple						
complex	0.76	0.76	0.66	0.76	0.754	0.174	0.189	0.810	0.939	497
new_supplier	0.64	0.71	0.91	0.62	0.644	0.479	0		1	452
hhi_input92	0.14	0.14	0.05	0.15	0.143	0.230	0.000	0.071	1.000	334
Hhi_input96					0.116	0.175	0.000	0.095	0.920	290
barter94	20.23	25.33	13.89	21.88	21.066	24.074	0.000	10.000	100.000	380
patent98	0.19	0.21	0.18	0.08	0.152	0.360	0.000		1.000	479
Market Structure:										
hhi90	0.06	0.08	0.02	0.07	0.065	0.102	0.000	0.039	0.932	420
gini97					0.324	0.119	0.089	0.325	1.000	478
export	0.50	0.53	0.36	0.34	0.424	0.495	0		1	432
import	0.20	0.24	0.15	0.21	0.198	0.177	0.001	0.173	0.822	420
Governance:										
manager_sh94	8.15	15.90	11.13	10.05	9.343	15.193	0.000	4.000	100.000	415
State_sh94	32.26	29.42	21.76	47.84	34.086	40.583	0.000	14.950	100.000	458
Other:										
emp_log90	7.02	7.16	6.49	7.08	6.997	1.580	2.079	7.007	11.575	431
emp_log98					6.193	1.628	2.079	6.178	11.582	415
labpro_logdif90					-0.093	0.659	-3.750	-0.021	2.201	193
laborpro90	33.79	36.42	37.48	28.15	38.183	48.313	0.360	24.993	518.370	298
profit92	0.23	0.22	0.30	0.24	0.241	0.255	-1.575	0.209	3.022	391

Table 7. Pairwise correlations.

	complex	new_sup	hhi_inp92	Hhi_inp96	barter94	patent98	hhi90	gini97	export	import	mansh94	statsh94	emp_l~90	emp_l~98	l~ldif90	labor~90	profit92
complex	1.000																
new_supplier	-0.047	1.000															
	0.320																
hhi_input92	0.143	-0.022	1.000														
	0.009	0.700															
hhi_input96	-0.060	0.110	0.890	1.000													
	0.312	0.068	0.000														
barter94	0.064	0.018	0.025	-0.022	1.000												
	0.213	0.737	0.678	0.736													
patent98	0.030	0.102	-0.025	0.020	-0.026	1.000											
	0.520	0.031	0.656	0.736	0.614												
hhi90	0.050	0.017	0.118	0.259	0.009	0.071	1.000										
	0.310	0.735	0.046	0.000	0.880	0.154											
gini97	-0.036	-0.032	-0.006	0.035	0.074	0.036	0.099	1.000									
	0.439	0.508	0.914	0.562	0.156	0.444	0.042										
export	0.154	0.074	0.122	0.301	0.135	0.186	0.188	0.028	1.000								
	0.001	0.136	0.029	0.000	0.012	0.000	0.000	0.564									
import	0.245	0.060	0.009	0.090	0.048	-0.005	0.102	-0.062	0.181	1.000							
	0.000	0.237	0.880	0.153	0.382	0.923	0.053	0.206	0.001								
Manager_sh94	-0.039	0.009	-0.082	-0.129	0.077	-0.035	-0.070	-0.003	-0.089	-0.132	1.000						
	0.432	0.854	0.162	0.041	0.162	0.485	0.191	0.955	0.086	0.013							
State_sh94	0.083	-0.124	0.152	0.171	-0.088	0.049	0.083	-0.077	-0.019	0.029	-0.399	1.000					
	0.076	0.011	0.007	0.005	0.094	0.306	0.103	0.107	0.699	0.565	0.000						
emp_log90	0.154	0.055	0.114	0.296	0.092	0.175	0.241	-0.036	0.551	0.150	-0.140	0.023	1.000				
	0.001	0.272	0.048	0.000	0.087	0.000	0.000	0.458	0.000	0.003	0.007	0.648					
emp_log98	0.111	0.025	0.176	0.254	0.069	0.263	0.167	-0.062	0.482	0.003	-0.179	0.024	0.888	1.000			
	0.024	0.626	0.002	0.000	0.208	0.000	0.002	0.218	0.000	0.961	0.001	0.631	0.000				
labpro_logdif90	-0.043	0.084	-0.063	-0.093	0.024	0.075	0.043	0.053	0.104	0.097	0.047	-0.128	-0.025	-0.117	1.000		
	0.516	0.220	0.415	0.256	0.740	0.267	0.536	0.426	0.126	0.159	0.518	0.060	0.703	0.095			
laborpro90	-0.231	0.007	0.009	0.007	-0.029	0.026	-0.071	-0.084	-0.026	-0.090	0.095	-0.017	-0.032	0.036	0.470	1.000	
	0.000	0.901	0.900	0.923	0.656	0.662	0.253	0.154	0.667	0.139	0.130	0.777	0.584	0.563	0.000		
profit92	0.087	0.063	-0.001	0.064	-0.055	0.008	0.023	0.026	0.088	0.033	0.085	-0.057	0.090	0.088	0.197	-0.051	1
	0.086	0.231	0.988	0.316	0.324	0.879	0.680	0.610	0.095	0.544	0.117	0.270	0.079	0.104	0.003	0.397	

Table 8. Factors of Reorganizations.

	Multinomial logit		**Probit**
	break-ups	**M&A**	**reorg_d**
complex	0.095	0.283	0.029
	(0.933)	(0.889)	(0.856)
new_supplier	0.361	**1.684**	0.082
	(0.347)	**(0.085)**+	(0.105)
hhi_input92	0.364	-0.975	0.044
	(0.668)	(0.659)	(0.709)
barter94	0.01	-0.012	0.001
	(0.195)	(0.616)	(0.275)
patent98	0.113	0.107	0.023
	(0.778)	(0.896)	(0.691)
laborpro90	0.004	-0.002	0.001
	(0.504)	(0.803)	(0.52)
profit92	-0.791	2.206	-0.064
	(0.275)	(0.178)	(0.599)
Hhi90	2.602	**-25.722**	0.338
	(0.132)	**(0.054)**+	(0.172)
import	**1.915**	-0.878	0.223
	(0.085)+	(0.7)	(0.155)
export	-0.346	0.09	-0.039
	(0.416)	(0.917)	(0.531)
Manager_sh94	**0.026**	0.005	**0.004**
	(0.008)**	(0.795)	**(0.022)***
State_sh94	-0.003	-0.007	-0.001
	(0.526)	(0.494)	(0.444)
emp_log90	0.065	0.066	0.01
	(0.54)	(0.23)	(0.54)

Absolute value of z-statistics in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 9. Vertical integration.

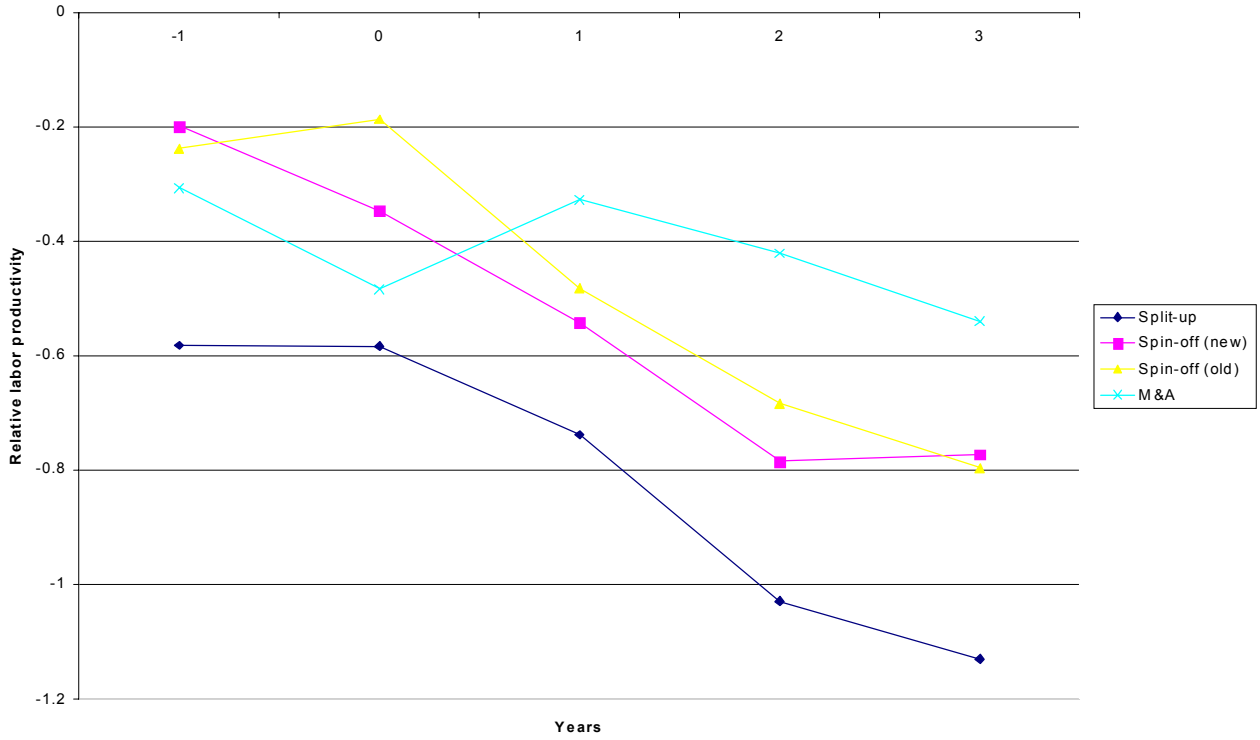
	Supplier_block
complex	-0.103
	(0.001)**
Hhi_input96	-0.074
	(0.047)*
patent98	0.119
	(0.001)**
gini97	-0.270
	(0.000)**
emp_log98	-0.003
	(0.519)
Power and fuel	0.105
	(0.100)+
Iron and steel, non-ferrous metals	0.364
	(0.008)**
Chemicals and petrochemistry	0.164
	(0.083)+
Forestry, woodworking, pulp and paper	0.236
	(0.026)*
Construction materials	0.420
	(0.009)**
Light industry	0.018
	(0.627)
Food-processing	0.035
	(0.336)
Other	0.063
	(0.276)
Observations	260
pseudoR2	0.299

Absolute value of z-statistics in parentheses

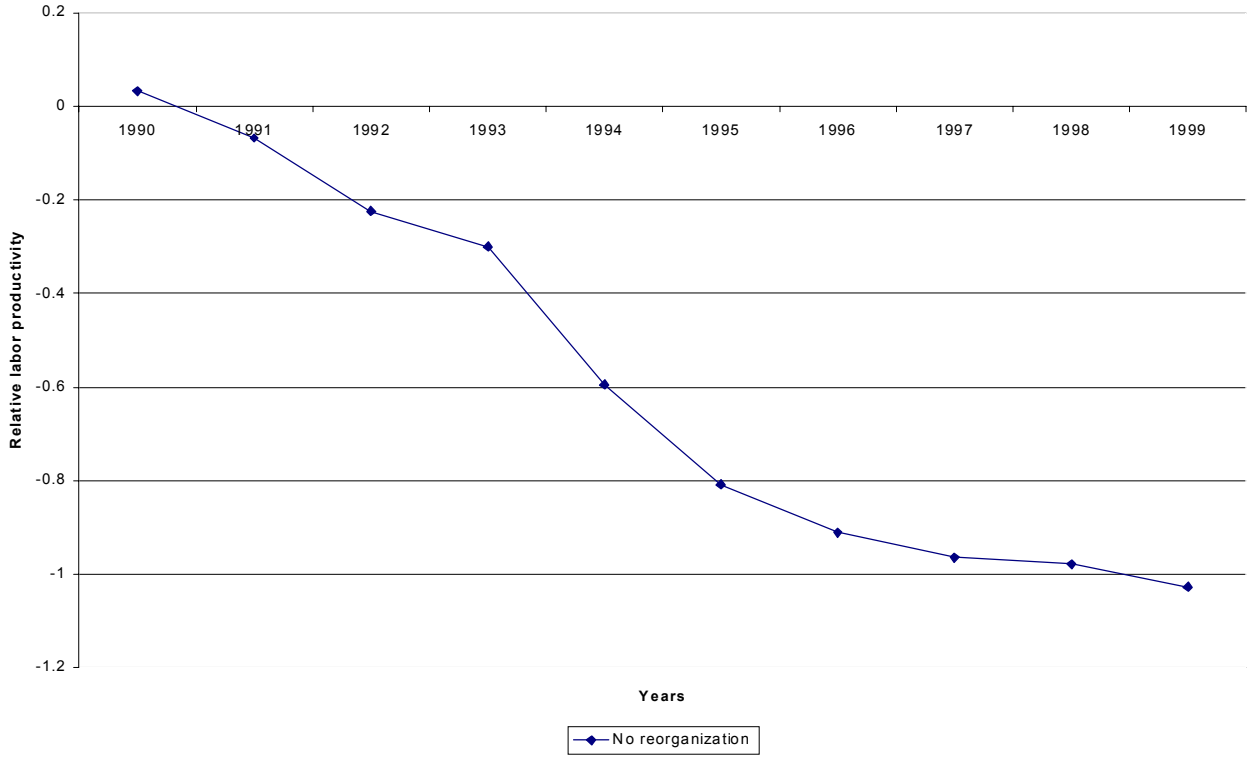
+ significant at 10%; * significant at 5%; ** significant at 1%

	Customer_block
complex	-0.031
	(0.791)
patent98	0.018
	(0.646)
barter94	0.001
	(0.071)+
gini97	0.176
	(0.093)+
emp_log98	0.010
	(0.361)
Power and fuel	0.151
	(0.032)*
Iron and steel, non-ferrous metals	0.079
	(0.356)
Chemicals and petrochemistry	-0.020
	(0.760)
Forestry, woodworking, pulp and paper	0.023
	(0.800)
Construction materials	0.004
	(0.947)
Light industry	-0.045
	(0.450)
Food-processing	0.097
	(0.227)
Other	0.025
	(0.772)
Observations	315
pseudoR2	0.078

Graph 12. Labor Productivity After Reorganization



Graph 13. Labor Productivity for Firms with no Reorganizations



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